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(54) METHOD OF PRODUCING TITANIUM DIOXIDE

There is a known method for producing titanium dioxide by oxidizing titanium tetrachloride in oxygen-containing plasma. In this case, oxygen is heated in a high-frequency gas discharge. However, this method is complicated due to the complex system for creating an oxygen-containing plasma.

In order to simplify the process, it is proposed to heat the oxygen-containing gas in a stabilized electric arc.

Atmospheric air with the dust removed is used as the plasma-forming gas. The air plasma is produced in electric arc heaters. To improve the mixing, three plasma jets are introduced into the reaction zone such that the jets form a plasma funnel, into which is introduced finely atomized liquid TiCl_4 . The reacting flow at speed of 700 m/s passes through a quenching nozzle into a cooled volume. From the cooled volume, the dust-containing mixture is directed to a system for trapping the TiO_2 .

Tests are conducted with 20% oxygen excess, temperature of the air plasma at the entry to the reaction zone 3000-3200°K; temperature in the reaction zone 2200-2300°K; dwell time for the reagents in the reaction zone $2 \cdot 10^{-3}$ s; outlay of electricity 2-3 kWh/kg of TiO_2 . The resulting titanium dioxide contains 87-97% rutile without introduction of rutilizing additives, the TiO_2 particle diameter is 0.1-0.4 μ ; the particle shape is spherical and oval (electron microscope analysis).

The chlorine gas leaving the titanium dioxide trapping system contains around 25 vol. % of chlorine. The chlorine gas is used to produce chlorine derivatives. A mixture of oxygen and air (70% oxygen, 30% air) is used as the plasma-forming gas, which makes it possible to reduce the outlay of energy for production of titanium dioxide to 1.3-1.5 kWh/kg of TiO_2 and obtain concentrated chlorine gas (chlorine content around 70 vol. %). Such chlorine gas can be used for chlorination of titanium-containing raw material.

Patent claim

Method of production of titanium dioxide by oxidizing titanium tetrachloride in oxygen-containing plasma, characterized in that, to simplify the process, the oxygen-containing gas is heated in a stabilized electric arc.

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